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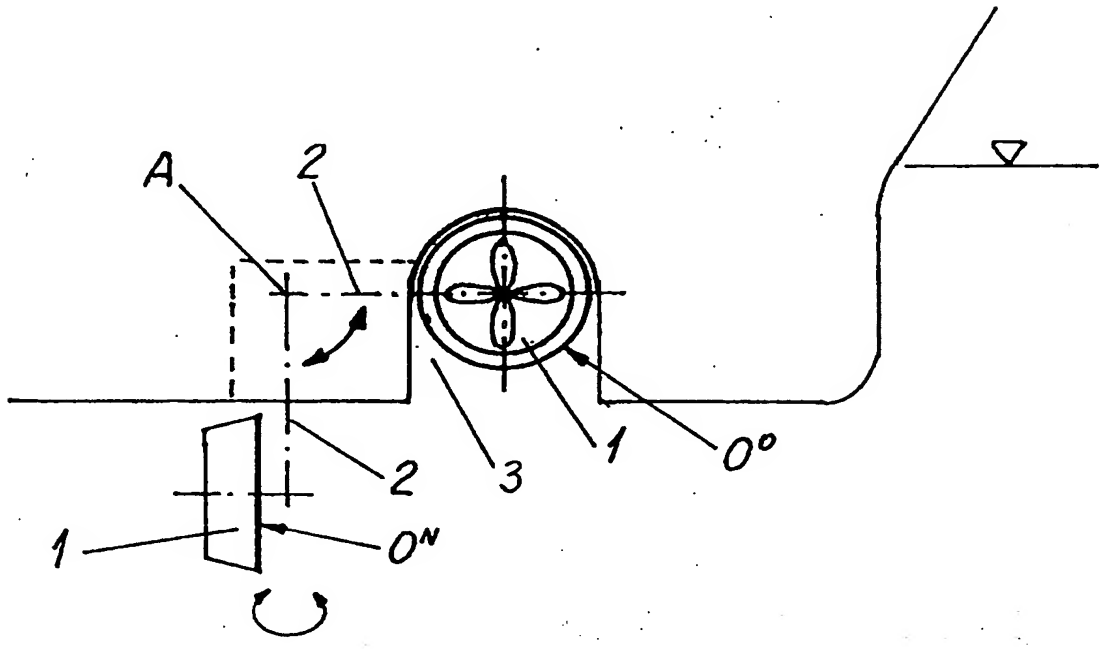
(54) Title: STEERING AND/OR PROPULSION DEVICE FOR A VESSEL



(57) Abstract

A steering and/or propulsion device for a vessel, preferably for installation in the bow portion of the vessel, comprising a propeller nozzle assembly (1) adapted to be rotated 360° about its vertical axis (2). The propeller/nozzle assembly (1) is provided for two active drive positions, one position (O^N) below the bottom of the vessel and one position (O^O) in a preferably downwardly open channel (3) in the bottom portion of the vessel, whereby the direction of the rotational axis of the propeller is coincident with the axis direction or longitudinal direction of the channel. The propeller/nozzle assembly (1) can be reversed also in the upper operative position.

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Steering and/or propulsion device for a vessel.

The present invention relates to a steering and/or propulsion device for a vessel, preferably for installation in the bow portion of the vessel, comprising a propeller nozzle assembly adapted to be rotated 360° about its vertical axis. Drive power to the propeller and rotational force to the assembly are supplied from devices inside the vessel. The propeller may be of a fixed type or it may be a variable pitch propeller. Propeller/nozzle assemblies of this type are for instance disclosed in the Norwegian patent publication 136038. Such assemblies are commonly called "thrusters".

US 3517633 shows crossing channels in a hull, one channel i the longitudinal direction and one channel in the transverse direction. A propeller, which does not work inside a nozzle, has two active positions, one in each channel, but in the same height, whereby the propeller may work in the longitudinal as well as in the transverse direction of the vessel. A downward aperture is situated remote from the propeller, at the rearward exit from the longitudinal channel, for discharge of water for forward propulsion. The propeller is only to work in the two channels. The publication mentions as prior art a so-called "bow thruster", which works in a transverse channel in the vessel , a so-called "retractible thruster", which is lowered prior to use and which can be pulled up when not in use, and a so-called "steerable thruster", which works below the bottom of the vessel and which can be turned 360°.

US 4294186 shows a propeller which only has one active position, below the bottom of the vessel. The pull-up position is merely a "storing position". This is an assembly of the type "retractible thruster" mentioned above. The propeller can only work in the transverse direction of the vessel in the lowered position. The propeller cannot be turned in any of the positions. Therefore, the propeller must be symmetrical in order to be able to work in both of the rotational directions, i.e. in order to produce drive force in both of the transverse directions of the vessel. The propeller can only work in a single level, below the bottom of the vessel.

By the present invention a steering and/or propulsion device of the type mentioned introductorily has been provided, and is characterized in that the propeller/nozzle assembly is mounted for movement between two active drive positions, one position below the bottom of the vessel and one position in a transverse channel in the bottom portion of the vessel, whereby the direction of the rotational axis of the propeller is

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coincident with the longitudinal direction of the channel.

Thus, the present invention relates to a propeller/nozzle assembly which can be situated in two active positions, a first active position pulled up/swung up in a downwardly open channel, and a second active position lowered/swung down below the bottom of the vessel. Both of these positions are active; i.e. that the propeller can work in both of these positions. In the pulled-up/swung-up position the assembly can also be used in shallow water, including to and from a quay or mooring site.

In an embodiment of the invention the propeller/nozzle assembly is adapted to be raised and lowered by pivoting the stem of the thruster up and down, respectively, about a horizontal axis, i.e. that the thruster is of a so-called "swing-up" type, whereby the propeller/nozzle assembly prior to the swinging up is pivoted about the stem axis in order that the propeller/nozzle axis be parallel to the channel axis.

In another embodiment of the invention the propeller/nozzle assembly is adapted to be raised and lowered by a translatory vertical movement, for instance when the stem is telescopical.

The invention will be described more detailed with reference to the accompanying drawings.

Figs. 1 and 3 diagrammatically show a "swing-up" version and a vertically movable version, respectively, of a thruster for conventional use, having only a lower operative position.

Figs. 2 and 4 diagrammatically show an embodiment of the invention in a "swing-up" version and a vertically movable version, respectively, the propeller/nozzle assembly being shown in the two operative positions.

In the Figs. 1 and 3 is indicated a thruster in a "swing-up" version and a vertically movable version, respectively, comprising a propeller/nozzle assembly 1 mounted on a stem indicated by its center line 2. Here, the thruster is adapted to be pivoted and moved vertically, respectively, from a lower, operative position O^N to an upper, not operative position S where the propeller/nozzle assembly is hidden in a recess R in the bottom portion of the vessel.

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Fig. 2 shows diagrammatically an embodiment of the invention in which a thruster of a "swing-up" version, i.e. a thruster adapted to be pivoted about a horizontal axis A, has two operative positions, a lower operative position O^N below the bottom portion of the vessel and an upper operative position O^O in a downwardly open channel 3 in the bottom portion of the vessel. By turning the propeller/nozzle assembly 1, in the lower operative position, in such a manner that the propeller axis extends parallelly to the axis of the channel 3 the thruster will, when it reaches the upper operative position, mainly function in the same manner as a conventional tunnel thruster. With the thruster embodiment according to the invention it is, however, also possible to reverse the orientation of the propeller/nozzle assembly 1 in the upper operative position O^O. Thus, the propeller/nozzle assembly is oriented in accordance with the desired thrust direction.

The embodiment shown in Fig. 4 departs from that of Fig. 2 in that the thruster is of a so-called vertically movable version, while the functioning in other respects is identical, also as regards the orientation of the propeller/nozzle assembly in the upper operative position.

Driving of the propeller, the turning of the propeller about the stem axis of the thruster and the pivoting, i.e. the vertical movement of the thruster, takes place in a known manner.

Tunnel thrusters of a conventional type have a propeller which works in a tunnel of circular cross section extending through the underwater portion of the vessel, along or transversely of the longitudinal direction of the vessel. In order to achieve equal propeller action in both directions of the tunnel the propeller blades must be shaped with a symmetrical profile, i.e. without curved profile, whereby the action of the propeller is the same for both of the rotational directions. From the same reason it has not been possible to introduce a radial pitch distribution, which among else would have reduced the load on the propeller blade tips. Such a propeller blade shape is in fact contradictory to prevailing circulation theories and well established aero- and hydrodynamical principles. The drawbacks of these known tunnel thruster embodiments are avoided by use of the present invention, in which the propeller/nozzle assembly can be oriented in one direction or in the other direction prior to being brought into the channel, and the propeller blades may, consequently, be shaped with an optimal profile curvature and radial pitch distribution, respectively.

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Claims.

1. A steering and/or propulsion device for a vessel, preferably for installation in the bow portion of the vessel, comprising a propeller nozzle assembly (1) adapted to be rotated 360° about its vertical axis (2), characterized in that the propeller/nozzle assembly (1) is mounted for movement between two active drive positions, one position (O^N) below the bottom of the vessel and one position (O^O) in a transverse channel (3) in the bottom portion of the vessel, whereby the direction of the rotational axis of the propeller is coincident with the longitudinal direction of the channel.

2. A device according to claim 1, characterized in that the propeller/nozzle assembly (1) is adapted to be raised and lowered by being pivoted about a horizontal axis (A) in the bottom portion of the vessel.

3. A device according to claim 1, characterized in that the propeller/nozzle assembly (1) is adapted to be raised and lowered by being moved vertically.

4. A device according to claim 3, characterized in that the propeller/nozzle assembly (1) is constructed with a telescopically movable stem (2).

5. A device according to the claims 1 - 4, characterized in that the channel cross section is dimensioned in such a manner that the propeller/nozzle assembly (1) can be reversed in the channel (3).

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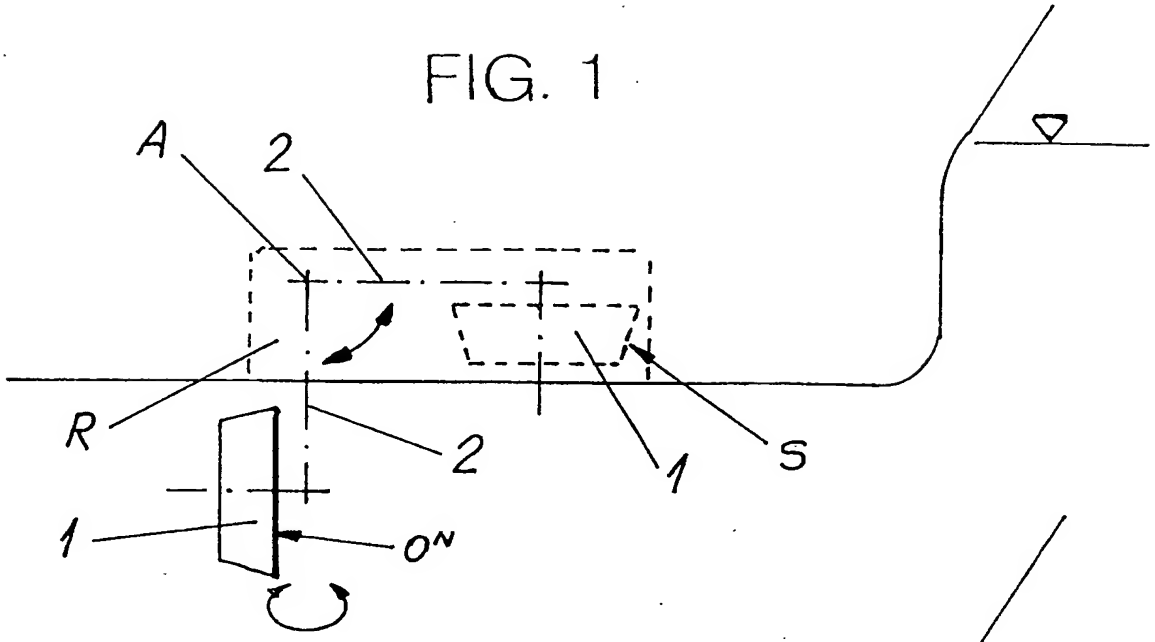
FIG. 1



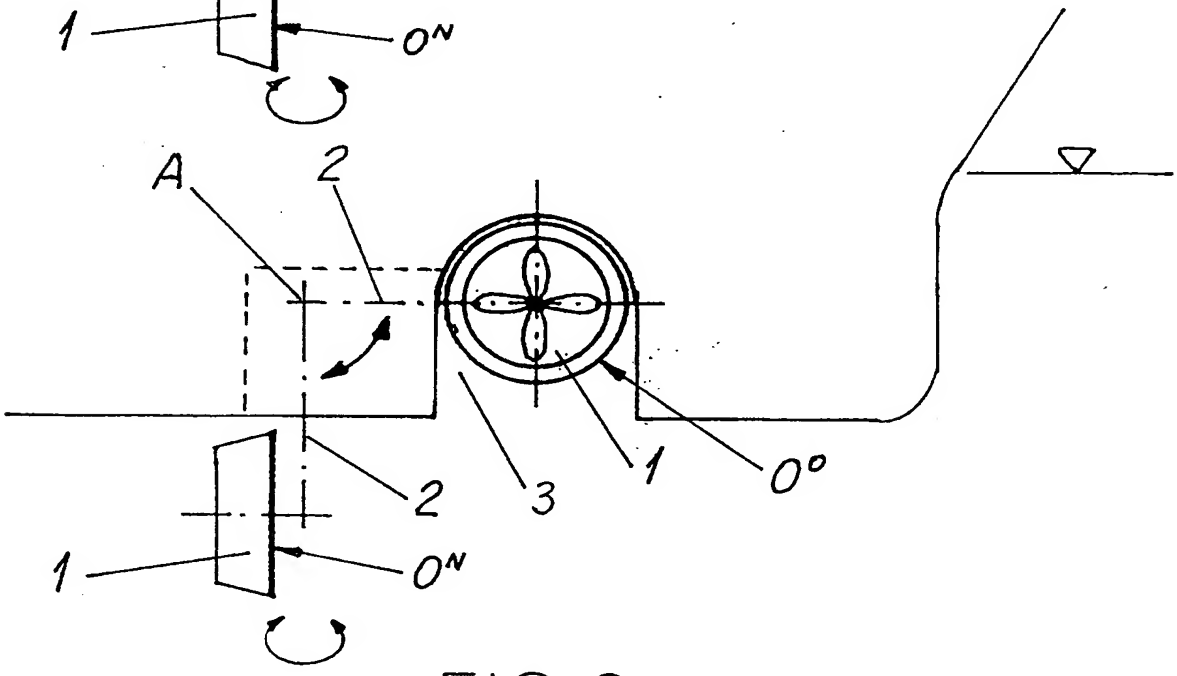


FIG. 2

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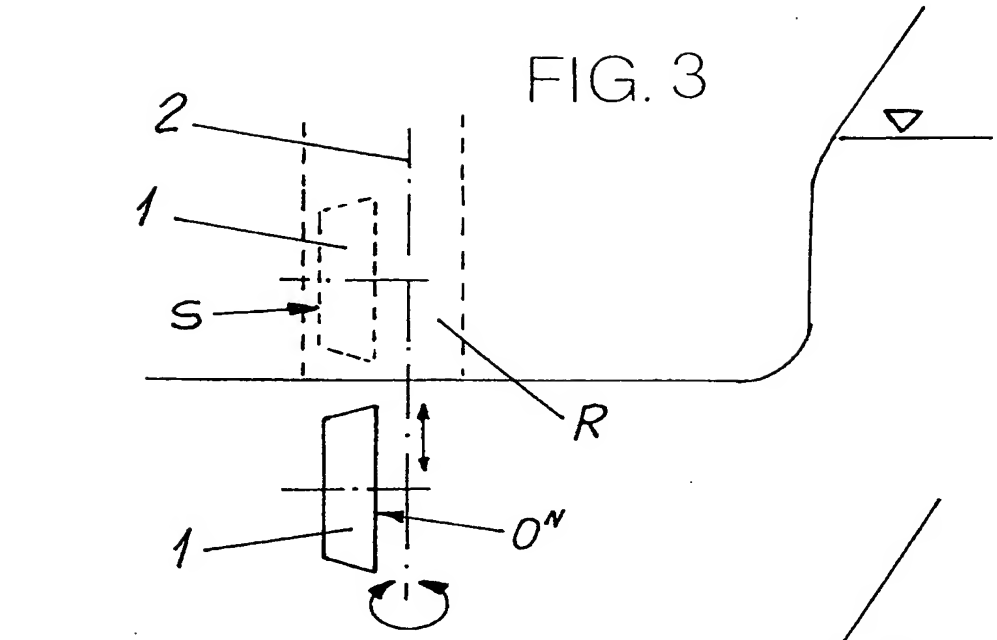
FIG. 3



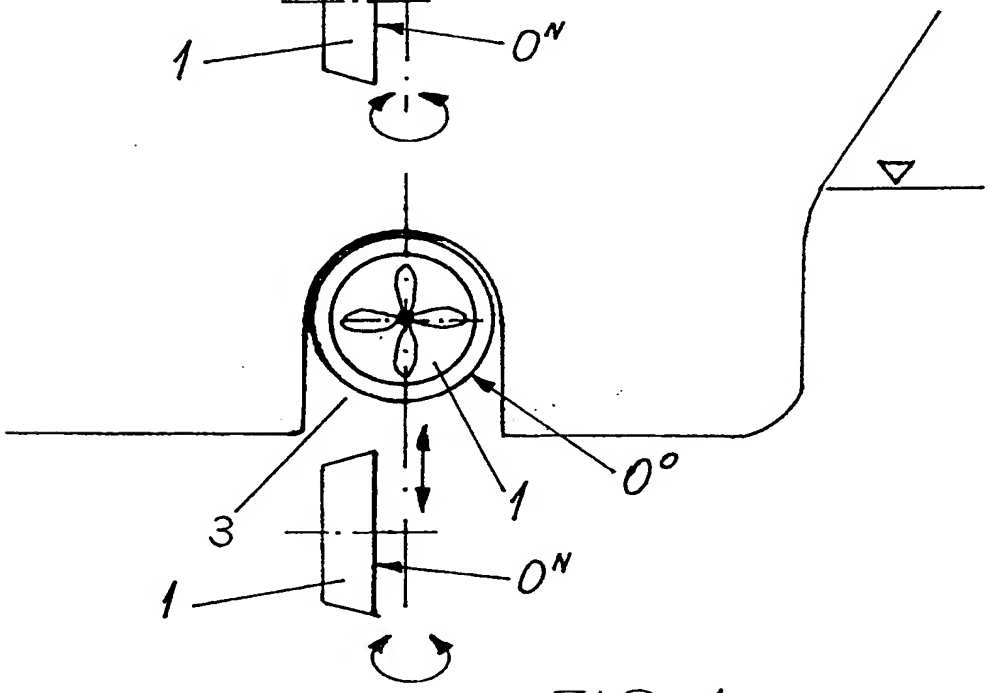


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 98/00007

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B63H 5/125, B63H 25/42
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B63H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 1136907 B1 (PETER JASTRAM), 22 February 1960 (22.02.60), column 5, line 26 - line 66, figures 1, 2	1-5
X	US 5522335 A (VERONESI ET AL), 4 June 1996 (04.06.96), figures 1,2, abstract	1-5
X	US 3550547 A (PLEUGER), 29 December 1970 (29.12.70), figure 1, abstract	1-5
A	Derwent's abstract, No J-3826 D/36, week J36, ABSTRACT OF SU, 669781 (OVSYANNIKOV M S), 15 December 1980 (15.12.80)	2

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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20 April 1998	28.04.98
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3517633 A (A.W. WANZER), 30 June 1970 (30.06.70)	5

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INTERNATIONAL SEARCH REPORT

Information on patent family members

02/04/98

International application No.
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 1136907 B1	22/02/60	NONE	
US 5522335 A	04/06/96	NONE	
US 3550547 A	29/12/70	DE 1756689 A	23/07/70
		FR 1580093 A	29/08/69
		GB 1226398 A	24/03/71
US 3517633 A	30/06/70	NONE	

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